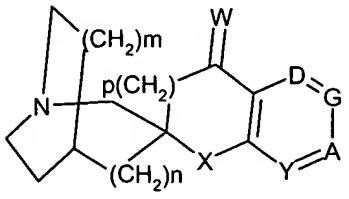
CLAIMS

1. A pharmaceutical composition comprising a compound of formula I



I

wherein n is 0 or 1;

m is 0 or 1;

p is 0;

Y is CH, N or NO

X is oxygen or sulfur;

W is two H moieties;

A is N or $C(R^2)$;

G is N or $C(R^3)$;

D is N or $C(R^4)$;

with the proviso that no more than one of A, G, and D is nitrogen but at least one of Y, A, G, and D is nitrogen or NO;

R^1 is hydrogen or C_1–C_4 alkyl;

R^2, R^3, and R^4 are independently hydrogen, halogen, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, aryl, heteroaryl, OH, OC_1–C_4 alkyl, CO_2R^1, –CN, $–NO_2$, $–NR^5R^6$, $–CF_3$, $–OSO_2CF_3$, or R^2 and R^3, or R^3 and R^4, respectively, may together form another six membered aromatic or heteroaromatic ring sharing A and G, or G and D, respectively containing between zero and two nitrogen atoms, and substituted with one to two of the following substituents: independently hydrogen, halogen, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2-C_4 alkynyl, aryl, heteroaryl, OH, OC_1–C_4 alkyl, CO_2R^1, –CN, $–NO_2$, $–NR^5R^6$, $–CF_3$, OSO_2CF_3;

R^5 and R^6 are independently hydrogen, C_1–C_4 alkyl, $C(O)R^7$, $C(O)NHR^8$, $C(O)OR^9$, SO_2R^{10} or may together be $(CH_2)_jQ(CH_2)_k$ where Q is O, S, NR^{11}, or a bond;

j is 2 to 7;

k is 0 to 2;

R^7, R^8, R^9, R^{10}, and R^{11} are independently C_1–C_4 alkyl, aryl, or heteroaryl;

together with at least one inert pharmaceutically acceptable diluent or carrier.

2. A pharmaceutical composition according to Claim 1, comprising a compound selected from:

spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-bromospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-phenylspiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-nitrospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)- furo[2,3-b]pyridine];

1'-chlorospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]isoquinoline];

5'-(phenylcarboxamido)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(phenylaminocarbonylamino)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(phenylsulfonylamido)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-aminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N-methylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N,N-dimethylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N,N-diethylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N-ethylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N-benzylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N-formamidospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-N-acetamidospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]isoquinoline];

spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]quinoline];

5'-ethenylspiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(E)-(phenylethenyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(4-morpholino)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(1-azetidinyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(E)-(2-(4-pyridyl)ethenyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(E)-(2-(2-pyridyl)ethenyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(2-trimethylsilylethynyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-ethynylspiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(2-furyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-(3-pyridyl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];

5'-methylspiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine-5'carbonitrile];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine-5'carboxamide];
5'-N'-(3-chlorophenyl)ureidoaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
5'-N'-(2-nitrophenyl)ureidoaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-chlorospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-methoxyspiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-phenylthiospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-(N-2-aminoethyl)aminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-Phenylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-methylaminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4'-(4-N-methylpiperazin-1-yl)spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
4-chloro-spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[3,2-c]pyridine];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[3,2-c]pyridine];
6'-fluorospiro[1-azabicyclo[2.2.2]octane-3,2'(3'H)-furo[2,3-b]pyridine];
spiro[1-azabicyclo[2.2.2]octane-3,2'(3'H)-furo[2,3-b]pyridine-6'-carbonitrile];
6'-chlorospiro[1-azabicyclo[2.2.2]octane-3,2'(3'H)-furo[2,3-b]pyridine];
or an enantiomer, or a pharmaceutically acceptable salt thereof.

3. A pharmaceutical composition according to Claim 1, comprising a compound selected from:
5'-bromospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
5'-phenylspiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
5'-nitrospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)- furo[2,3-b]pyridine];
5'-aminospiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]isoquinoline];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]quinoline];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine];
spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine-5'carboxamide];
or an enantiomer, or a pharmaceutically acceptable salt thereof.

4. A pharmaceutical composition according to Claim 1, comprising (2'*R*)-spiro[1-azabicyclo[2.2.2]octane-3,2'-(3'H)-furo[2,3-b]pyridine]; or a pharmaceutically acceptable salt thereof.

5. A pharmaceutical composition according to Claim 1, comprising less than 80% by weight of said compound of formula I in admixture with an inert pharmaceutically acceptable diluent or carrier.

6. A pharmaceutical composition according to Claim 1, comprising less than 50% by weight of said compound of formula I in admixture with an inert pharmaceutically acceptable diluent or carrier.

7. A pharmaceutical composition according to Claim 1, wherein said at least one inert pharmaceutically acceptable diluent or carrier is selected from lactose, starch, talc, stearic acid, tartaric acid, water, alcohols, glycerin, vegetable oils and natural or hardened oils or waxes.

8. A pharmaceutical composition according to Claim 1, wherein said composition is formulated as:

a tablet or dragee and wherein said at least one inert pharmaceutically acceptable diluent or carrier is selected from lactose, starch, talc, stearic acid;

a capsules wherein said at least one inert pharmaceutically acceptable diluent or carrier is selected from tartaric acid or lactose; or

an injectable solution wherein said at least one inert pharmaceutically acceptable diluent or carrier is selected from water, alcohols, glycerin, vegetable oils; or

a suppositorie wherein said at least one inert pharmaceutically acceptable diluent or carrier is selected from natural or hardened oils or waxes.

9. A method for treating or preventing a condition or disorder arising from dysfunction of nicotinic acetylcholine receptor neurotransmission comprising administering a pharmaceutical composition according to Claim 8.

10. A method for treating or preventing a condition or disorder arising from dysfunction of nicotinic acetylcholine receptor neurotransmission comprising administering a pharmaceutical composition according to Claim 1.

11. The method of Claim 10, comprising administering a daily dosage of of said compound of formula I from about 0.1 mg to about 20 mg per kg of body weight in divided doses 1 to 4 times a day or in sustained release form.

12. The method of Claim 10, comprising administering a total daily dose of said compound of formula I in the range of from 5 mg to 1,400 mg.

13. The method of Claim 12, comprising administering a total daily dose of said compound of formula I in the range of from 10 mg to 100 mg.

14. The method of Claim 10, comprising administering a total daily dose of said compound of formula I by oral administration of from 2 mg to 1,400 mg admixed with a solid or liquid pharmaceutical carrier or diluent.

15. The method of Claim 10 wherein said condition or disorder is selected from schizophrenia, mania, manic depression, or anxiety.

16. The method of Claim 10 wherein said condition or disorder is selected from Alzheimer's disease, learning deficit, cognition deficit, attention deficit, memory loss, or Attention Deficit Hyperactivity Disorder.

17. The method of Claim 10 wherein said condition or disorder is selected from pain, chronic pain, Parkinson's disease, Huntington's disease, Tourette's syndrome, or neurodegenerative disorders in which there is loss of cholinergic synapses.

18. A method for inducing the cessation of smoking, or for the treatment or prophylaxis of nicotine addiction comprising administering a pharmaceutical composition according to Claim 1.

19. A process for the preparation of a pharmaceutical composition according to Claim 1 which comprises mixing the ingredients.